Water Quality Assessment
the Gunnison River
City of Delta
City of Delta Wastewater Treatment Plant

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I. Water Quality Assessment Summary

Table A-1 includes summary information related to this WQA. This summary table includes key regulatory starting points used in development of the WQA such as: receiving stream information; threatened and endangered species; 303(d) and Monitoring and Evaluation listings; low flow and facility flow summaries; and a list of parameters evaluated.

Table A-1
WQA Summary

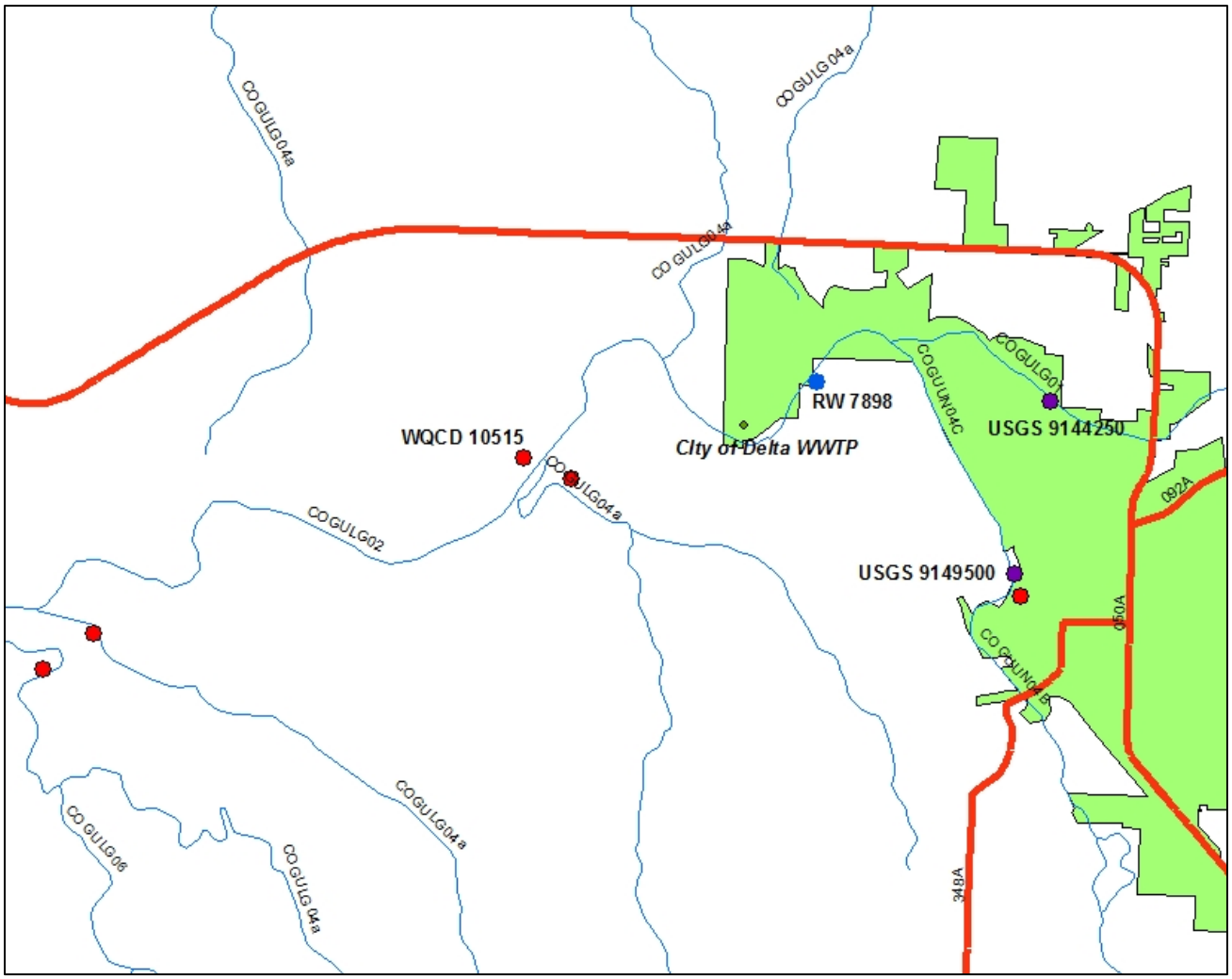
Facility Information			
Facility Name	**Permit Number**	**Design Flow (max 30-day ave, MGD)**	**Design Flow (max 30-day ave, CFS)**
City of Delta Wastewater Treatment Plant	CO0039641	2.45	3.8
Receiving Stream Information			
Receiving Stream Name	**Segment ID**	**Designation**	**Classification(s)**
The Gunnison River	COGULG02	Undesignated	Aquatic Life Warm 1 Recreation Class E Agriculture Water Supply
Low Flows (cfs)			
1E3 (1-day)	**7E3 (7-day)**	**30E3 (30-day)**	**Ratio of 30E3 to the Design Flow (cfs)**
439	494	552	145:1

Regulatory Information					
T&E Species	**303(d) (Reg 93)**	**Monitor and Eval (Reg 93)**	**Existing TMDL**	**Temporary Modification(s)**	**Control Regulation**
Yes	E. coli	Sediment	Se	Type A Se(ch)= current conditions Expiration date of Dec. 31, 2017	None
Pollutants Evaluated					
Ammonia, E. Coli, TRC, Metals, Temp					

II. Introduction

The water quality assessment (WQA) of the Gunnison River near the City of Delta Wastewater Treatment Plant (WWTP), located in Delta County, is intended to determine the assimilative capacities available for pollutants found to be of concern. This WQA describes how the water quality based effluent limits (WQBELs) are developed. These parameters may or may not appear in the permit with limitations or monitoring requirements, subject to other determinations such as reasonable potential analysis, evaluation of federal effluent limitation guidelines, implementation of state-based technology based limits, mixing zone analyses, 303(d) listings, threatened and endangered species listing, or other requirements as discussed in the permit rationale. Figure A-1 contains a map of the study area evaluated as part of this WQA.

FIGURE A-1



The City of Delta WWTP discharges to the Gunnison River, which is stream segment COGULG02. This means the Gunnison River Basin, Lower Gunnison Sub-basin, Stream Segment 02. This

segment is composed of the "Mainstem of the Gunnison River from a point immediately above the confluence with the Uncompahgre River to the confluence with the Colorado River.". Stream segment COGULG02 is classified for Aquatic Life Warm 1, Recreation Class E, Water Supply and Agriculture.

Information used in this assessment includes data gathered from the City of Delta Wastewater Treatment Plant, the Division, Riverwatch, the U.S. Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS), and communications with the local water commissioner. The data used in the assessment consist of the best information available at the time of preparation of this WQA analysis.

III. Water Quality Standards

Narrative Standards

Narrative Statewide Basic Standards have been developed in Section 31.11(1) of the regulations, and apply to any pollutant of concern, even where there is no numeric standard for that pollutant. Waters of the state shall be free from substances attributable to human-caused point source or nonpoint source discharges in amounts, concentrations or combinations which:

for all surface waters except wetlands;

(i) can settle to form bottom deposits detrimental to the beneficial uses. Depositions are stream bottom buildup of materials which include but are not limited to anaerobic sludge, mine slurry or tailings, silt, or mud; or (ii) form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or (iii) produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species or to the water; or (iv) are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or (v) produce a predominance of undesirable aquatic life; or (vi) cause a film on the surface or produce a deposit on shorelines; and

for surface waters in wetlands;

(i) produce color, odor, changes in pH, or other conditions in such a degree as to create a nuisance or harm water quality dependent functions or impart any undesirable taste to significant edible aquatic species of the wetland; or (ii) are toxic to humans, animals, plants, or aquatic life of the wetland.

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for any parameter of concern could be put in CDPS discharge permits.

Standards for Organic Parameters and Radionuclides

Radionuclides: Statewide Basic Standards have been developed in Section 31.11(2) and (3) of The Basic Standards and Methodologies for Surface Water to protect the waters of the state from radionuclides and organic chemicals.

In no case shall radioactive materials in surface waters be increased by any cause attributable to municipal, industrial, or agricultural practices or discharges to as to exceed the following levels, unless alternative site-specific standards have been adopted. Standards for radionuclides are shown in Table A-2.

Table A-2
Radionuclide Standards

Parameter	Picocuries per Liter
Americium 241*	0.15
Cesium 134	80
Plutonium 239, and 240*	0.15
Radium 226 and 228*	5
Strontium 90*	8
Thorium 230 and 232*	60
Tritium	20,000

*Radionuclide samples for these materials should be analyzed using unfiltered (total) samples. These Human Health based standards are 30-day average values for both plutonium and americium.

Organics: The organic pollutant standards contained in the Basic Standards for Organic Chemicals Table are applicable to all surface waters of the state for the corresponding use classifications, unless alternative site-specific standards have been adopted. These standards have been adopted as "interim standards" and will remain in effect until alternative permanent standards are adopted by the Commission. These interim standards shall not be considered final or permanent standards subject to antibacksliding or downgrading restrictions. Although not reproduced in this WQA, the specific standards for organic chemicals can be found in Regulation 31.11(3).

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for radionuclides, organics, or any other parameter of concern could be put in CDPS discharge permits.

The aquatic life standards for organics apply to all stream segments that are classified for aquatic life. The water supply standards apply only to those segments that are classified for water supply. The water + fish standards apply to those segments that have a Class 1 aquatic life and a water supply classification. The fish ingestion standards apply to Class 1 aquatic life segments that do not have a water supply designation. The water + fish and the fish ingestion standards may also apply to Class 2 aquatic life segments, where the Water Quality Control Commission has made such determination.

Because the the Gunnison River is classified for Aquatic Life Warm 1, with a water supply designation, the water + fish and aquatic life standards apply to this discharge.

Salinity and Phosphorus

Phosphorus: Regulations 71, 72, 73 and 74, for Dillon Reservoir Watershed, Cherry Creek Reservoir Watershed, Chatfield Reservoir Watershed and the Bear Creek Watershed, contain requirements for phosphorus concentrations and phosphorus annual loadings for point source dischargers. If a facility discharges to one of these watersheds, a phosphorus allocation may be necessary, and limitations and annual loadings may be added to a permit.

Salinity: Regulation 61.8(2)(l) contains requirements regarding salinity for any discharges to the Colorado River Watershed. For industrial dischargers and for the discharge of intercepted groundwater, this is a no-salt discharge requirement. However, the regulation states that this requirement may be waived where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 350 tons per year. The Division may permit the discharge of salt upon a satisfactory demonstration that it is not practicable to prevent the discharge of all salt. See Regulation 61.8(2)(l)(i)(A)(1) for industrial discharges and 61.8(2)(l)(iii) for discharges of intercepted groundwater for more information regarding this demonstration.

For municipal dischargers, an incremental increase of 400 mg/l above the flow weighted averaged salinity of the intake water supply is allowed. This may be waived where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 366 tons per year. The Division may permit the discharge of salt in excess of the 400 mg/l incremental increase, upon a satisfactory demonstration that it is not practicable to attain this limit. See Regulation 61.8(2)(l)(vi)(A)(1) for more information regarding this demonstration.

Regulation 75 contains requirements for the release of water from Cheraw Lake. Any entity releasing water from Cheraw Lake must ensure that either: 1) the water has a TDS concentration less than or equal to 4300 mg/l, or 2) that an adequate quantity of water of less saline nature can be supplied for dilution purposes such that a salinity level of 4300 ppm, measured as TDS, can be maintained in Horse Creek immediately above the first diversion below the confluence with the Cheraw Lake outlet channel.

In addition, the Division's policy, Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, may be applied to discharges where an agricultural water intake exists downstream of a discharge point. Limitations for electrical conductivity and sodium absorption ratio may be applied in accordance with this policy.

Temperature

Temperature shall maintain a normal pattern of diurnal and seasonal fluctuations with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deemed deleterious to the resident aquatic life. This standard shall not be interpreted or applied in a manner inconsistent with section 25-8-104, C.R.S.

Segment Specific Numeric Standards

Numeric standards are developed on a basin-specific basis and are adopted for particular stream segments by the Water Quality Control Commission. The standards in Table A-3 have been assigned to stream segment COGULG02 in accordance with the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins*.

An amendment to the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins* that becomes effective on March 30, 2013, will change the applicable standards for stream segment COGULG02. This WQA has been developed in conformance with the water quality standards that will become effective on March 30, 2013, as any permitting action based on this WQA would take effect immediately after (or just prior) to the effective date of this regulation.

Table A-3 **In-stream Standards for Stream Segment COGULG02**
Physical and Biological
Dissolved Oxygen (DO) = 6 mg/l, minimum (7 mg/l, minimum during spawning)
pH = 6.5 - 9 su
E. coli chronic = 126 colonies/100 ml
Temperature March-Nov = 27.5° C MWAT and 28.6° C DM
Temperature Dec-Feb = 13.8° C MWAT and 14.3° C DM
Inorganic
Total Ammonia acute and chronic = TVS
Chlorine acute = 0.019 mg/l
Chlorine chronic = 0.011 mg/l
Free Cyanide acute = 0.005 mg/l
Sulfide chronic = 0.002 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 0.05 mg/l
Nitrate acute = 10 mg/l
Chloride chronic = 250 mg/l
Sulfate chronic = For WS, the greater of ambient water quality as of January 1, 2000 or 250 mg/l
Metals
Dissolved Arsenic acute = 340 µg/l
Total Recoverable Arsenic chronic = 0.02 µg/l
Dissolved Cadmium acute for trout and Dissolved Cadmium chronic = TVS
Total Recoverable Trivalent Chromium acute = 50 µg/l
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Dissolved Iron chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 300 µg/l
Total Recoverable Iron chronic = 1000 µg/l
Dissolved Lead acute and chronic = TVS
Dissolved Manganese chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 50 µg/l
Dissolved Manganese acute and chronic = TVS
Total Recoverable Molybdenum chronic = 210 µg/l
Total Mercury chronic = 0.01 µg/l
Dissolved Nickel acute and chronic = TVS
Dissolved Selenium acute and chronic = TVS
Dissolved Silver acute and Dissolved Silver chronic for trout = TVS
Dissolved Zinc acute and chronic = TVS
Additional Parameters Being Considered in This WQA, Based on Regulation 31
Nonylphenol acute = 28 µg/l
Nonylphenol chronic = 6.6 µg/l

Table Value Standards and Hardness Calculations

Standards for metals are generally shown in the regulations as Table Value Standards (TVS), and these often must be derived from equations that depend on the receiving stream hardness or species of fish present; for ammonia, standards are discussed further in Section IV of this WQA. The Classification and Numeric Standards documents for each basin include a specification for appropriate hardness values to be used. Specifically, the regulations state that:

> The hardness values used in calculating the appropriate metal standard should be based on the lower 95% confidence limit of the mean hardness value at the periodic low flow criteria as determined from a regression analysis of site-specific data. Where insufficient site-specific data exists to define the mean hardness value at the periodic low flow criteria, representative regional data shall be used to perform the regression analysis. Where a regression analysis is not appropriate, a site-specific method should be used.

Hardness data for the Gunnison River near the point of discharge of the City of Delta Wastewater Treatment Plant WWTP were insufficient to conduct a regression analysis based on the low flow. Therefore, the Division's alternative approach to calculating hardness was used, which involves computing a mean hardness.

The mean hardness was computed to be 300 mg/l based on sampling data from Water Quality Control Division station number 10515 located on the Gunnison River approximately 1½ miles downstream from the City of Delta Wastewater Treatment Plant. This hardness value and the formulas contained in the TVS were used to calculate the in-stream water quality standards for metals, with the results shown in Table A-4.

Table A-4

TVS-Based Metals Water Quality Standards for CO0039641

Based on the Table Value Standards Contained in the Colorado Department of Public Health and Environment Water Quality Control Commission *Regulation 35*

Parameter	***In-Stream Water Quality Standard***		***TVS Formula: Hardness (mg/l) as CaCO3 =*** **300**
Cadmium, Dissolved	Acute	4.4 µg/l	$[1.136672-0.041838\ln(\text{hardness})]e^{(0.9151(\ln(\text{hardness}))-3.6236)}$
	Chronic	0.97 µg/l	$[1.101672-0.041838\ln(\text{hardness})]e^{(0.7998(\ln(\text{hardness}))-4.4451)}$
Hexavalent Chromium, Dissolved	Acute	16 µg/l	Numeric standards provided, formula not applicable
	Chronic	11 µg/l	Numeric standards provided, formula not applicable
Copper, Dissolved	Acute	38 µg/l	$e^{(0.9422(\ln(\text{hardness}))-1.7408)}$
	Chronic	23 µg/l	$e^{(0.8545(\ln(\text{hardness}))-1.7428)}$
Lead, Dissolved	Acute	209 µg/l	$[1.46203-0.145712\ln(\text{hardness})][e^{(1.273(\ln(\text{hardness}))-1.46)}]$
	Chronic	8.1 µg/l	$[1.46203-0.145712\ln(\text{hardness})][e^{(1.273(\ln(\text{hardness}))-4.705)}]$
Manganese, Dissolved	Acute	4305 µg/l	$e^{(0.3331(\ln(\text{hardness}))+6.4676)}$
	Chronic	2379 µg/l	$e^{(0.3331(\ln(\text{hardness}))+5.8743)}$
Nickel, Dissolved	Acute	1186 µg/l	$e^{(0.846(\ln(\text{hardness}))+2.253)}$
	Chronic	132 µg/l	$e^{(0.846(\ln(\text{hardness}))+0.0554)}$
Selenium, Dissolved	Acute	18.4 µg/l	Numeric standards provided, formula not applicable
	Chronic	4.6 µg/l	Numeric standards provided, formula not applicable
Silver, Dissolved	Acute	13 µg/l	$½\ e^{(1.72(\ln(\text{hardness}))-6.52)}$
	Chronic	0.5 µg/l	$e^{(1.72(\ln(\text{hardness}))-10.51)}$
Zinc, Dissolved	Acute	366 µg/l	$0.978e^{(0.8525(\ln(\text{hardness}))+1.0617)}$
	Chronic	317 µg/l	$0.986\ e^{(0.8525(\ln(\text{hardness}))+0.9109)}$

Total Maximum Daily Loads and Regulation 93 – Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List

This stream segment is listed for monitoring and evaluation for sediment. According to Division standard procedure, the Division's Environmental Data Unit investigates issues of water quality standard exceedances. If it is determined that the water body is impaired, the segment will be added to the 303(d) list. At a minimum, the permit may contain monitoring requirements to support a future TMDL if the segment is listed.

This stream segment is on the 303(d) list of water quality impacted streams for *E. coli.*

For a receiving water placed on this list, the Restoration and Protection Unit is tasked with developing the Total Maximum Daily Loads (TMDLs) and the Waste Load Allocation (WLAs) to be distributed to the affected facilities. WLAs for *E. coli* have not yet been established and the allowable concentration calculated in the following sections may change upon further evaluation by the Division.

This stream segment also has a TMDL for selenium. The Division's Restoration and Protection Unit have completed the TMDL and therefore the requirements of this TMDL apply for selenium. For this permit, the TMDL states that the waste load allocation (WLA) for this facility is 0.094 lbs/day.

IV. Receiving Stream Information

Low Flow Analysis

The Colorado Regulations specify the use of low flow conditions when establishing water quality based effluent limitations, specifically the acute and chronic low flows. The acute low flow, referred to as 1E3, represents the one-day low flow recurring in a three-year interval, and is used in developing limitations based on an acute standard. The 7-day average low flow, 7E3, represents the seven-day average low flow recurring in a 3 year interval, and is used in developing limitations based on a Maximum Weekly Average Temperature standard (MWAT). The chronic low flow, 30E3, represents the 30-day average low flow recurring in a three-year interval, and is used in developing limitations based on a chronic standard.

To determine the low flows available to the City of Delta WWTF, USGS gage stations 09144250 (Gunnison River at Delta, CO) and 09149500 (Uncompahgre River at Delta, CO) were used. The sum of these flow gages, provide a representative measurement of flow upstream of the City of Delta WWTF because the facility is located just below the confluence of the Gunnison and Uncompahgre Rivers.

The sum of the daily flows were obtained and the annual 1E3, 7E3, and 30E3 low flows were calculated using U.S. Environmental Protection Agency (EPA) DFLOW software. The output from DFLOW provides calculated acute and chronic low flows for each month.

Flow data from October 1, 2001 through September 30, 2011 were available from the gage stations. The gage stations and time frames were deemed the most accurate and representative of current flows and were therefore used in this analysis.

Based on the low flow analysis described previously, the upstream low flows available to the City of Delta Wastewater Treatment Plant were calculated and are presented in Table A-5a.

Table A-5a

Low Flows for the Gunnison River at the City of Delta Wastewater Treatment Plant WWTP

Low Flow (cfs)	*Annual*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*

Table A-5a Low Flows for the Gunnison River at the City of Delta Wastewater Treatment Plant WWTP													
1E3 Acute	439	511	456	497	439	540	544	624	601	605	649	588	543
7E3 Chronic	494	514	494	507	494	587	574	624	640	654	682	588	552
30E3 Chronic	552	552	552	552	554	611	611	624	685	685	682	588	552

During the months of July and November, the acute low flow calculated by DFLOW exceeded the chronic low flow. In accordance with Division standard procedures, the acute low flow was thus set equal to the chronic low flow for these months.

The ratio of the low flow of the Gunnison River to the City of Delta Wastewater Treatment Plant WWTP design flow is 145:1.

Mixing Zones

The amount of the available assimilative capacity (dilution) that may be used by the permittee for the purposes of calculating the WQBELs may be limited in a permitting action based upon a mixing zone analysis or other factor. These other factors that may reduce the amount of assimilative capacity available in a permit are: presence of other dischargers in the vicinity; the presence of a water diversion downstream of the discharge (in the mixing zone); the need to provide a zone of passage for aquatic life; the likelihood of bioaccumulation of toxins in fish or wildlife; habitat considerations such as fish spawning or nursery areas; the presence of threatened and endangered species; potential for human exposure through drinking water or recreation; the possibility that aquatic life will be attracted to the effluent plume; the potential for adverse effects on groundwater; and the toxicity or persistence of the substance discharged.

Unless a facility has performed a mixing zone study during the course of the previous permit, and a decision has been made regarding the amount of the assimilative capacity that can be used by the facility, the Division assumes that the full assimilative capacity can be allocated. Note that the review of mixing study considerations, exemptions and perhaps performing a new mixing study (due to changes in low flow, change in facility design flow, channel geomorphology or other reason) is evaluated in every permit and permit renewal.

If a mixing zone study has been performed and a decision regarding the amount of available assimilative capacity has been made, the Division may calculate the water quality based effluent limitations (WQBELs) based on this available capacity. In addition, the amount of assimilative capacity may be reduced by T&E implications.

This facility is discharging to a segment that contains threatened and endangered (T&E) species, as listed by the US Fish and Wildlife (F&W), which affects the aquatic life standards. Under a Memorandum of Agreement (MOA) between the US F&W and the Division, this facility needed to meet one of several options outlined in the MOA. The facility opted to install a diffuser on the

discharge which means instantaneous mixing will occur, and therefore the mixing zone considerations (dilution) apply. A dilution of 50% was determined in the previous WQA and referenced in the amendment Fact Sheet for the installation of the diffuser. Since the diffuser remains in use, this dilution remains applicable to the discharge for aquatic-life based pollutants. Therefore, 50% of the low flows calculated in Section IV of this WQA will be used in the calculation of the aquatic-life basedWQBELs in the following section, and are shown in Table A-5b.

Table A-5b

Reduced Low Flows for the Gunnison River at the City of Delta Wastewater Treatment Plant WWTP,
Based on Diffuser Installation

Low Flow (cfs)	***Annual***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
1E3 Acute	219.5	255.5	228.0	248.5	219.5	270.0	272.0	312.0	300.5	302.5	324.5	294.0	271.5
7E3 Chronic	247.1	257.0	247.1	253.5	247.1	293.5	287.0	312.0	320.0	327.0	341.0	294.0	275.8
30E3 Chronic	275.8	275.8	275.8	275.8	277.0	305.5	305.5	312.0	342.5	342.5	341.0	294.0	275.8

Ambient Water Quality

The Division evaluates ambient water quality based on a variety of statistical methods as prescribed in Section 31.8(2)(a)(i) and 31.8(2)(b)(i)(B) of the *Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 31*, and as outlined in the Division's Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits (WQP-19). Ambient water quality is evaluated in this WQA analysis for use in determining assimilative capacities and in completing antidegradation reviews for pollutants of concern, where applicable.

To conduct an assessment of the ambient water quality upstream of the City of Delta Wastewater Treatment Plant, data were gathered primarily from Riverwatch station 7898, located approximately ½ mile upstream from the facility. Data were available for a period of record from June 2009 through April 2011. Data were also gathered from WQCD station 10515 for E. coli, chromium, mercury, nickel, silver, uranium, and hardness. WQCD station 10515 is located approximately 1½ miles downstream from the facility. Note that although these data are based on samples collected at downstream locations, they are comparable to data representative of upstream water quality because of the large amount of dilution available. Data were available for a period of record from January 1999 through April 2008. Data from these sources were used to reflect upstream water quality. These data are summarized in Table A-6.

Table A-6

Ambient Water Quality for the Gunnison River

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Maximum*	*Chronic Stream Standard*	*Notes*
pH (su)	21	8.3	8.3	8.4	8.3	8.5	6.5-9	
E. coli (#/100 ml)	15	8	109	152	53	727	126	1, 4
NH_3 as N, Tot (mg/l)	3	0	0	0	0	0	TVS	2
Al, Dis (µg/l)	19	0	0	0	1.7	18	NA	2
As, TR (µg/l)	19	0	0	0	0	0	0.02	2
As, Dis (µg/l)	19	0	0	0	0	0	340	2
Cd, Dis (µg/l)	19	0	0	0.29	0.14	0.82	0.97	2
Cr, TR (µg/l)	1	0	0	0	0	0	50	2, 4
Cu, Dis (µg/l)	19	0	2.7	5.4	2.7	7.8	23	2
Fe, TR (µg/l)	19	176	774	2649	1595	8483	1000	
Pb, Dis (µg/l)	19	0	0	0	0.39	4.1	8.1	2
Mn, Dis (µg/l)	19	21	34	49	34	59	2379	
Hg, Tot (µg/l)	20	0	0	0	0	0	0.01	2, 4
Ni, Dis (µg/l)	1	0	0	0	0	0	132	2, 4
Se, Dis (µg/l)	19	0	8.4	14	7.6	16	4.6	2, 3
Ag, Dis (µg/l)	15	0	0	0	0	0	0.5	2,4
U, Dis (µg/l)	1	8	8	8	8	8	NA	4
Zn, Dis (µg/l)	19	0	0	8.1	2.8	8.9	317	2
Hardness as $CaCO_3$ (mg/l)	15	164	280	319	263	470	NA	4

Note 1: The calculated mean is the geometric mean. Note that for summarization purposes, the value of one was used where there was no detectable amount because the geometric mean cannot be calculated using a value equal to zero.

Note 2: When sample results were below detection levels, the value of zero was used in accordance with the Division's standard approach for summarization and averaging purposes.

Note 3: The ambient water quality exceeds the water quality standards for these parameters.

Note 4: Collected from downstream location.

V. Facility Information and Pollutants Evaluated

Facility Information

The City of Delta Wastewater Treatment Plant WWTP is located at in the E 1/2 of the NE 1/4 of S15, T15S, R96W; 1398 Hwy 50 in Delta, CO 81416; at 38° 45' 0.7" latitude North and 108° 6' 6.3" longitude West in Delta County. The current design capacity of the facility is 2.45MGD (3.8 cfs). Wastewater treatment is accomplished using a mechanical wastewater treatment process. The technical analyses that follow include assessments of the assimilative capacity based on this design capacity.

The City of Delta WWTF is the only listed individual permit that is discharging to this segment. There are several sand & gravel permits, but these do not affect the assimilative capacities available to the City of Delta WWTF. The ambient water quality background concentrations used in the mass-balance equation account for pollutants of concern contributed by upstream sources, and therefore it was not necessary to model upstream dischargers together with the City of Delta WWTF when determining the available assimilative capacities in the Gunnison River. Based on available information, there is no indication that non-point sources were a significant source of pollutants of concern. Thus, non-point sources were not considered in this assessment.

Pollutants of Concern

Pollutants of concern may be determined by one or more of the following: facility type; effluent characteristics and chemistry; effluent water quality data; receiving water quality; presence of federal effluent limitation guidelines; or other information. Parameters evaluated in this WQA may or may not appear in a permit with limitations or monitoring requirements, subject to other determinations such as a reasonable potential analysis, mixing zone analyses, 303(d) listings, threatened and endangered species listings or other requirement as discussed in a permit rationale.

There are no site-specific in-stream water quality standards for BOD_5 or $CBOD_5$, TSS, percent removal, and oil and grease for this receiving stream. Thus, assimilative capacities were not determined for these parameters. The applicable limitations for these pollutants can be found in Regulation No. 62 and will be applied in the permit for the WWTP.

The following parameters were identified by the Division as pollutants to be evaluated for this facility:

- Total Residual Chlorine
- *E. coli*
- Ammonia
- Temperature
- Metals and Cyanide
- Nonylphenols

It is the Division's standard procedure to consider metals and cyanide as potential pollutants of concern for all major domestic WWTPs.

According to the *Rationale for Classifications, Standards and Designations of the Gunnison River*, stream segment COGULG02 is designated a water supply because the City of Grand Junction (PWSID #139321) has an emergency water diversion on the east abutment of the Redlands Water and Power diversion dam and may withdraw water from this segment as a portion of their domestic water supply. However, the location of this intake is almost 50 miles downstream. Therefore, the nitrate standard, which is applied at the point of intake to a water supply, and the dissolved iron, sulfate, (human health based) dissolved manganese, are not evaluated as part of this analysis. Note that the aquatic life based dissolved manganese standard remains applicable.

During assessment of the facility, nearby facilities, and receiving stream water quality, no additional parameters were identified as pollutants of concern.

VI. Determination of Water Quality Based Effluent Limitations (WQBELs)

Technical Information

Note that the WQBELs developed in the following paragraphs, are calculations of what an effluent limitation may be in a permit. The WQBELs for any given parameter, will be compared to other potential limitations (federal Effluent Limitations Guidelines, State Effluent Limitations, or other applicable limitation) and typically the more stringent limit is incorporated into a permit. If the WQBEL is the more stringent limitation, incorporation into a permit is dependent upon a reasonable potential analysis.

In-stream background data and low flows evaluated in Sections II and III are used to determine the assimilative capacity of the Gunnison River near the City of Delta Wastewater Treatment Plant WWTP for pollutants of concern, and to calculate the WQBELs. For all parameters except ammonia, it is the Division's approach to calculate the WQBELs using the lowest of the monthly low flows (referred to as the annual low flow) as determined in the low flow analysis. For ammonia, it is the standard procedure of the Division to determine monthly WQBELs using the monthly low flows, as the regulations allow the use of seasonal flows.

The Division's standard analysis consists of steady-state, mass-balance calculations for most pollutants and modeling for pollutants such as ammonia. The mass-balance equation is used by the Division to calculate the WQBELs, and accounts for the upstream concentration of a pollutant at the existing quality, critical low flow (minimal dilution), effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3 Q_3 - M_1 Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = In-stream background pollutant concentrations at the existing quality
M_2 = Calculated WQBEL
M_3 = Water Quality Standard, or other maximum allowable pollutant concentration

The upstream background pollutant concentrations used in the mass-balance equation will vary based on the regulatory definition of existing ambient water quality. For most pollutants, existing quality is determined to be the 85th percentile. For metals in the total or total recoverable form, existing quality is determined to be the 50th percentile. For pathogens such as fecal coliform and *E. coli*, existing quality is determined to be the geometric mean.

For temperature, the highest 7-day mean (for the chronic standard) of daily average stream temperature, over a seven consecutive day period will be used in calculations of the chronic temperature assimilative capacity, where the daily average temperature should be calculated from a minimum of three measurements spaced equally through the day. The highest 2-hour mean (for the acute standard) of stream temperature will be used in calculations of the acute temperature assimilative capacity. The highest 2-hour mean should be calculated from a minimum of 12 measurements spaced equally through the day.

Calculation of WQBELs

Using the mass-balance equation provided in the beginning of Section VI, the acute and chronic low flows set out in Section IV, ambient water quality as discussed in Section IV, and the in-stream standards shown in Section III, the WQBELs for were calculated. The data used and the resulting WQBELs, M_2, are set forth in Table A-7a for the chronic WQBELs and A-7b for the acute WQBELs.

When the ambient water quality exceeds the in-stream standard, the Division standard procedure is to allocate the water quality standard to prevent further degradation of the receiving waters.

As discussed in the Mixing Zone Section of this WQA, the WQBELs for aquatic life standards based will be calculated at a 50% dilution (M_2). For *E. coli* (recreation based), nitrate (agriculture based), and chloride (water supply based), the WQBELs will be calculated with 100% dilution, as these parameters are not aquatic life based and therefore the T&E classification does not impact these parameters.

Chlorine: There are no point sources discharging total residual chlorine within one mile of the City of Delta Wastewater Treatment Plant. Because chlorine is rapidly oxidized, in-stream levels of residual chlorine are detected only for a short distance below a source. Ambient chlorine was therefore assumed to be zero.

***E. coli*:** In the absence of *E. coli* ambient water quality data, fecal coliform ambient data are used as a conservative estimate of *E. coli* existing quality. For *E. coli*, the Division establishes the 7-day geometric mean limit as two times the 30-day geometric mean limit and also includes maximum limits of 2,000 colonies per 100 ml (30-day geometric mean) and 4,000 colonies per 100 ml (7-day geometric mean). This 2000 colony limitation also applies to discharges to ditches.

Temperature:
The 7E3 low flow is 494 cfs, resulting in a dilution ratio (7E3 low flow to effluent) of 130:1. As the discharge is from a Domestic WWTP where the available dilution ratio is > 10:1, in accordance with the Division's Temperature Policy, no temperature limitations are required.

Table A-7a

Chronic WQBELs

Parameter	Q_1 *(cfs)*	Q_2 *(cfs)*	Q_3 *(cfs)*	M_1	M_3	M_2	*Notes*
E. coli (#/100 ml)	552	3.8	555.8	53	126	***10730***	
TRC (mg/l)	275.8	3.8	279.6	0	0.011	***0.81***	
As, TR (µg/l)	275.8	3.8	279.6	0	0.02	***1.5***	
Cd, Dis (µg/l)	275.8	3.8	279.6	0.29	0.97	***50***	
Cr+6, Dis (µg/l)	275.8	3.8	279.6	0	11	***809***	
Cu, Dis (µg/l)	275.8	3.8	279.6	5.4	23	***1300***	
Fe, TR (µg/l)	275.8	3.8	279.6	774	1000	***17403***	
Pb, Dis (µg/l)	275.8	3.8	279.6	0	8.1	***596***	
Mn, Dis (µg/l)	275.8	3.8	279.6	49	2379	***171,488***	
Mo, TR (µg/l)	275.8	3.8	279.6	0	210	***15452***	
Hg, Tot (µg/l)	275.8	3.8	279.6	0	0.01	***0.74***	
Ni, Dis (µg/l)	275.8	3.8	279.6	0	132	***9712***	
Se, Dis (µg/l)	275.8	3.8	279.6	14	4.6	***4.6***	1
Ag, Dis (µg/l)	275.8	3.8	279.6	0	0.5	***37***	
Zn, Dis (µg/l)	275.8	3.8	279.6	8.1	317	***22737***	
Chloride (mg/l)	552	3.8	555.8	0	250	***36566***	
Sulfide as H2S (mg/l)	275.8	3.8	279.6	0	0.002	***0.15***	
Nonylphenol (µg/l)	275.8	3.8	279.6	0	6.6	***6.6***	

Table A-7b Acute WQBELs						
TRC (mg/l)	219.5	3.8	223.3	0	0.019	***1.1***
Nitrate as N (mg/l)	552	3.8	223.3	0	100	***14,626***
Nitrite as N (mg/l)	219.5	3.8	223.3	0	0.05	***2.9***
As, Dis (µg/l)	219.5	3.8	223.3	0	340	***19979***
Cd, Dis (µg/l)	219.5	3.8	223.3	0.29	4.4	***242***
Cr+3, TR (µg/l)	219.5	3.8	223.3	0	50	***2938***
Cr+6, Dis (µg/l)	219.5	3.8	223.3	0	16	***940***
Cu, Dis (µg/l)	219.5	3.8	223.3	5.4	38	***1921***
CN, Free (µg/l)	219.5	3.8	223.3	0	5	***294***
Pb, Dis (µg/l)	219.5	3.8	223.3	0	209	***12282***
Mn, Dis (µg/l)	219.5	3.8	223.3	49	4305	***250145***
Ni, Dis (µg/l)	219.5	3.8	223.3	0	1186	***69693***
Se, Dis (µg/l)	219.5	3.8	223.3	14	18.4	***273***
Ag, Dis (µg/l)	219.5	3.8	223.3	0	13	***764***
Zn, Dis (µg/l)	219.5	3.8	223.3	8.1	366	***21039***
Nonylphenol (µg/l)	219.5	3.8	223.3	0	28	***28***

Ammonia: The Ammonia Toxicity Model (AMMTOX) is a software program designed to project the downstream effects of ammonia and the ammonia assimilative capacities available to each discharger based on upstream water quality and effluent discharges. To develop data for the AMMTOX model, an in-stream water quality study should be conducted of the upstream receiving water conditions, particularly the pH and corresponding temperature, over a period of at least one year.

Temperature and corresponding pH data sets reflecting upstream ambient receiving water conditions were available for the Gunnison River from Riverwatch Station 7898. The data, reflecting a period of record from June 2009 through October 2011 were used to establish the average headwater conditions in the AMMTOX model. Effluent pH data were also available from the City of Delta Wastewater Treatment Plant and were used to establish the average facility contributions in the AMMTOX model.

There were no temperature data available for the City of Delta Wastewater Treatment Plant that could be used as adequate input data for the AMMTOX model. Therefore, the Division standard procedure is to rely on statistically-based, regionalized data for temperature compiled from similar facilities.

Upstream ammonia data for each month were not adequate to represent monthly ambient water quality concentrations for the AMMTOX. Thus, the mean total ammonia concentration found in the

Gunnison River as summarized in Table A-6 was used as an applicable upstream ammonia concentration reflective of each month.

The AMMTOX may be calibrated for a number of variables in addition to the data discussed above. The values used for the other variables in the model are listed below:

- Stream velocity = $0.3Q^{0.4d}$
- Default ammonia loss rate = 6/day
- pH amplitude was assumed to be medium
- Default times for pH maximum, temperature maximum, and time of day of occurrence
- pH rebound was set at the default value of 0.2 su per mile
- Temperature rebound was set at the default value of 0.7 degrees C per mile.

The results of the ammonia analyses for the City of Delta Wastewater Treatment Plant are presented in Table A-8.

Table A-8

AMMTOX Results for the Gunnison River at the City of Delta Wastewater Treatment Plant WWTP

Design of 2.45 MGD (3.8 cfs)

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	65	102
February	66	93
March	79	227
April	42	94
May	56	156
June	48	139
July	44	174
August	50	144
September	56	139
October	70	137
November	70	117
December	64	107

VII. Antidegradation Evaluation

As set out in *The Basic Standards and Methodologies for Surface Water*, Section 31.8(2)(b), an antidegradation analysis is required except in cases where the receiving water is designated as "Use Protected." Note that "Use Protected" waters are waters "that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process" as set out in Section 31.8(2)(b). The antidegradation section of the regulation became effective in December 2000, and therefore antidegradation considerations are applicable to this WQA analysis.

According to the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins*, stream segment COGULG02 is Undesignated. Thus, an antidegradation review may be conducted for this segment if new or increased impacts are found to occur. However, the ratio of the flow of the Gunnison River to the City of Delta WWTP design flow is 145:1 at low flows. Section 31.8 (3)(c) specifies that the discharge of pollutants should not be considered to result in significant degradation of the reviewable waters if the flow rate is greater than 100:1 dilution at low flow. Thus, Section 31.8(3)(c) of the regulations is met and no further antidegradation evaluation is necessary.

VIII. Technology Based Limitations

Federal Effluent Limitation Guidelines

The Federal Effluent Limitation Guidelines for domestic wastewater treatment facilities are the secondary treatment standards. These standards have been adopted into, and are applied out of, Regulation 62, the Regulations for Effluent Limitations.

Regulations for Effluent Limitations

Regulation No. 62, the Regulations for Effluent Limitations, includes effluent limitations that apply to all discharges of wastewater to State waters, with the exception of storm water and agricultural return flows. These regulations are applicable to the discharge from the proposed discharge.

Table A-9 contains a summary of the applicable limitations for pollutants of concern at this facility.

Table A-9

Regulation 62 Based Limitations

Parameter	***30-Day Average***	***7-Day Average***	***Instantaneous Maximum***
BOD_5	30 mg/l	45 mg/l	NA
BOD_5 Percent Removal	85%	NA	NA
TSS, mechanical plant	30 mg/l	45 mg/l	NA
TSS Percent Removal	85%	NA	NA
Total Residual Chlorine	NA	NA	0.5 mg/l
pH	NA	NA	6.0-9.0 s.u.
Oil and Grease	NA	NA	10 mg/l

IX. References

Regulations:

The Basic Standards and Methodologies for Surface Water, Regulation 31, Colorado Department Public Health and Environment, Water Quality Control Commission, effective September 30, 2012.

Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins, Regulation No. 35, Colorado Department Public Health and Environment, Water Quality Control Commission, effective 3/30/2013.

Colorado River Salinity Standards, Regulation 39, CDPHE, WQCC (last update effective 8/30/97)

Regulations for Effluent Limitations, Regulation 62, CDPHE, WQCC, March 30, 2008.

Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List, Regulation 93, Colorado Department Public Health and Environment, Water Quality Control Commission, effective March 30, 2013.

Policy and Guidance Documents:

Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, December 2001.

Memorandum Re: First Update to (Antidegradation) Guidance Version 1.0, Colorado Department Public Health and Environment, Water Quality Control Division, April 23, 2002.

Rationale for Classifications, Standards and Designations of Segments of the Gunnison River, Colorado Department Public Health and Environment, Water Quality Control Division, effective June 13, 2012.

Policy Concerning Escherichia coli versus Fecal Coliform, CDPHE, WQCD, July 20, 2005.

Colorado Mixing Zone Implementation Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, effective April 2002.

Policy for Conducting Assessments for Implementation of Temperature Standards in Discharge Permits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-23, effective July 3, 2008.

Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-24, effective March 10, 2008.

Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-19, effective May 2002.